ecomaine
Organics Recycling Feasibility Study

Andrew Carpenter, *Northern Tilth* – Belfast, Maine
The Northern Tilth Team

Northern Tilth
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Project Manager

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Coker Composting and Consulting
Craig Coker

Integrated Waste Management Consulting
Matt Cotton

Tech Environmental
Mike Lannan, P.E.
Dana Buske, PhD
Waste Composition

- Use existing data to provide an informed estimate of the waste composition that ecomaine is currently receiving
  - No new research, but a reconciliation of existing knowledge, nationally and locally
  - Account for organics collection programs in place, including Resurgam, institutional, and drop off programs and leaf and yard waste collection already in place
- Report will include high and low range estimates and influence of processing choice on potential diversion rates

Existing Collection Systems

- Determine the current capacity for organics collection with haulers that are servicing ecomaine communities
MSW Composition from 2011 U Maine Study

Organics, 43%
Paper, 26%
Other, 6%
Plastics, 13%
Metals, 3%
Glass, 3%
C&D, 3%
HHW, 2%
Electronics, 1%

2010 U.S. Total MSW Generation (by Material)
250 Million Tons (Before Recycling)

Organics, 27%
Paper, 29%
Other, 3%
Plastics, 13%
Metals, 9%
Glass, 5%
Wood, 6%
Rubber, leather, textiles, 8%
TASK 2 - Collection Systems
 TASK 3 - Technology Alternatives Evaluation

• Organics recycling = biological manufacturing
  – Inputs – food scraps, green wastes, organics portion of the MSW stream
  – Outputs – recovered energy (biogas), soil amendments (composts)
  – Byproducts – heat, water vapor, CO$_2$ (biogenic)

• Goal
  – Produce the desired amount of marketable product(s) at the needed rate at the lowest cost
Composting/Aerobic Digestion Process Flow Diagram

Facility activities

Collect Feedstocks

Feedstock receipt → Non-compostables

Feedstock preparation, mixing → Anaerobic Digestion

Active Composting

Curing

Screening

“Overs”

Monitoring

Product analysis

Product sales, distribution and use

Odor control

Biogas → Electricity, Heat

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Biogas → Electricity, Heat
Composting

Approach selection depends on:
- Risk tolerance
- Feedstock
- Budget
- Site and neighbors

Approaches vs. technology risk/costs:
- Static Pile vs. Turned Windrow vs. Aerated Static Pile vs. In-vessel
Open-air Windrow

Aerated Static Pile

In-Vessel
TASK 3 - Technology Alternatives Evaluation

• Anaerobic Digestion (AD)
  – A resource extraction step prior to composting
  – Approaches
    • Traditional Liquid Digester – wastewater plants
    • High Solids Slurry Digester – e.g. OWS/Dranco
    • Dry Fermentation Reactor – e.g. BioFerm
Site Evaluations to Focus on
- 2 parcels owned by ecomaine
- Opportunities and limitations as they relate to permitting
- Practical considerations including potential odor receptors, air quality, truck access and infrastructure
- Expansion opportunities for existing organics processing facilities – partnering options
TASK 4 - Siting Evaluations
TASK 4 - Organics Processing in ecomaine service area

- Some capacity is already in place for organics processing, and it is continuing to grow
- We will provide an estimate on current and future capacity
WTE Changes Related to Organics Diversion

Net Energy Comparisons for ..

- The existing WTE process
- The “new” WTE process with diversion
- The new WTE process - Waste stabilization
- The new WTE process + Anaerobic Digestion Process - Waste stabilization

WTE Diversion Considerations...

- Changes to Criteria Pollutants:
  - Nitrogen oxides
  - Particulate
  - Sulfur dioxide
- Formation of dioxins and furans
- Increased Corrosion potential
Guidance on Final Product
• Quality, Quality, Quality
• USCC Compost Seal of Testing Assurance
• Risk Reduction through production management and rigorous testing program

Existing Market and Estimates of Value
• Realistic approach to the potential markets for the finished compost
• Don’t assume that the first year of composting will produce a high-end compost for bagging
TASK 6 – Market Evaluation: Biogas

Uses

- Electricity production
- Natural gas pipeline injection
- Compression for vehicle fuel

Considerations

- **ecomaine** only gets $0.039/kWh for WTE electricity production in FY13
- Pipeline gas – low natural gas prices (and expected to stay low)
- Vehicle fuel – Some Metro buses and school buses already converted – expansion opportunities?
TASK 7 - Organics Plan & Economic Analysis

• Based on work from Tasks 1 through 6, we will develop up to 6 configurations of collection, processing and marketing organics recycling systems, including a macroeconomic level analysis of the configurations

• After workshop with ecomaine representatives, we will select one configuration and develop a Conceptual Organics Recycling Plan

• Plan Components
  – Recommended SSO diversion/collection strategy
  – Recommended SSO processing system
  – Recovered product(s) markets
  – Site layout & manufacturing process flow
  – Process steps sizings
  – Equipment and Utilities Plan
Economic Analysis

- **Capital Cost Estimate**
  - Site development
  - Utility infrastructure (power/data, water, sewer, storm water)
  - Facility construction
  - Equipment

- **Operating Cost Estimate**
  - Purchased feedstocks (if needed)
  - Labor
  - Maintenance
  - Power/Fuel
TASK 8 - Final Report and Presentations

- Final report to include
  - Summary of findings from each task in the feasibility study
  - Conceptual Organics Recycling Plan
  - Stand-alone summary of the organics plan including
    - Facility plan level costs
    - Rationale for technology choices
    - Summary of national and international programs with similar operations and constraints
    - A summary of permitting requirements for implementing the plan
    - Risks related to the plan and how they will be addressed
  - Detailed recommendations for initiating the program, from pilot to full scale implementation

- The Northern Tilth team will develop and give a presentation summarizing the findings from all of the steps from the feasibility study and a thorough explanation of the organics recycling plan
  - The presentation will be designed for ecomaine Board members and other important stakeholders
## Proposed Project Schedule

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- Waste Composition and status of Organics Collection and Diversion
- Site Evaluations
- Compost/Digestate Market Evaluations
- GHG Emissions Analysis
- Facility Plan
- Final Report and Presentations
- Technology Alternative Evaluations
- Biogas Market Evaluations
- Facility Plan
- Economic Analyses
- Final Report and Presentations
- Feedstock Collection Alternatives
- WTE Impact Analysis
- Air Quality Impact Analysis
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Questions?